

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2003P15450WO/R76/JJP	<b>FOR FURTHER ACTION</b> See Form PCT/IPEA/416	
International application No. PCT/GB2004/004222	International filing date (day/month/year) 05.10.2004	Priority date (day/month/year) 07.10.2003
International Patent Classification (IPC) or national classification and IPC H04Q7/36, H04B7/005		
Applicant ROKE MANOR RESEARCH LIMITED et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 4 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  04.08.2005	Date of completion of this report  02.01.2006	
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Helms, J  Telephone No. +49 89 2399-2451	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/004222

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-15 as originally filed

**Claims, Numbers**

1-24 received on 05.08.2005 with letter of 04.08.2005

**Drawings, Sheets**

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
  - ☐ the claims, Nos.
  - ☐ the drawings, sheets/figs
  - ☐ the sequence listing (*specify*):
  - ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/004222

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**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

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1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 23, 24

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☒ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. 23, 24 are so unclear that no meaningful opinion could be formed (*specify*):

**see separate sheet**

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos.

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See separate sheet for further details

**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/GB2004/004222

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-22
	No: Claims	
Inventive step (IS)	Yes: Claims	1-22
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

**Re Item III**

**Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The invention relates to a power control **loop** between a receiver having an associated beacon transmitter and a transmitter having an associated beacon receiver. Therefore, the invention based on the following essential features:
  - a **beacon transmitter** for transmitting a beacon in a beacon transmission band representing a frequency in a beacon managed band, the beacon transmission band is separated from the beacon managed band by using a different frequency
  - a **beacon receiver** determining the strength of the received beacon
  - a **transmitter** transmitting at said frequency in the beacon managed band with a power spectral density limit derived from the strength of the received beacon
  - a **receiver** for receiving at said frequency in the beacon managed band

Claims 23 and 24 being directed to only a transmitter and a receiver, respectively, do not comprise all of the essential features mentioned above required to describe the invention completely, thereby rendering the scope the claims unclear (Art. 6 PCT).

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:
  - D1: US-A-5 794 157 (HAARTSEN ET AL) 11 August 1998 (1998-08-11)
  - D2: US-A-5 491 837 (HAARTSEN ET AL) 13 February 1996 (1996-02-13)
  - D3: US-B1-6 377 608 (ZYREN JAMES G) 23 April 2002 (2002-04-23)
2. The application relates to a method and network for controlling interference from a transmitter in one communication system to a receiver in another communication system.

3. Document D1 which is considered to represent the closest prior art discloses the features of transmitting a beacon transmitter associated with the receiver, the beacon being representative of a frequency at which the receiver is trying to receive, listening for the beacon at a beacon receiver associated with the transmitter and deriving a power limit for a transmission from the transmitter based upon the strength of the beacon received at the beacon receiver.

With respect to the subject-matter of independent claims 1 (method) and 22 (network) document D1 does not disclose that the beacon is transmitted in a beacon transmission band, the beacon representing a frequency within a beacon managed band at which the receiver is trying to receive and that the beacon transmission band is separated from the beacon managed band by using a different frequency.

4. Based on the disclosure of document D1 the skilled person would like to improve the flexibility of the power measurement and control system for the interference reduction.
5. This problem is solved by the distinguishing features of claims 1 and 22 mentioned above which are neither disclosed nor rendered obvious by the prior art.
6. Claims 2-21 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**Re Item VII**

**Certain defects in the international application**

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 are not mentioned in the description, nor are these documents identified therein.
2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

CLAIMS

1. A method of controlling interference from a transmitter in one communication system to a receiver in another communication system, the method comprising  
5 transmitting a beacon in a beacon transmission band from a beacon transmitter associated with the receiver, the beacon being representative of a frequency within a beacon managed band at which the receiver is trying to receive; wherein the beacon transmission band is separated from the beacon managed band by using a different frequency; listening for the beacon at a beacon receiver associated with the transmitter;  
10 and deriving a power spectral density limit for a transmission from the transmitter based upon the strength of the beacon received at the beacon receiver.
2. A method according to claim 1, wherein, for a plurality of beacons received representing the same frequency, the derived transmit power spectral density limit is  
15 related to that of the beacon received at the highest power.
3. A method according to claim 1 or claim 2, further comprising comparing the transmit power spectral density limit with a predetermined minimum transmit power spectral density required by the transmitter for that frequency; and transmitting a signal  
20 at that frequency, only if the determined transmit power spectral density limit exceeds the minimum.
4. A method according to any preceding claim, wherein a predetermined maximum transmit power spectral density is set, if no beacons are received at the  
25 transmitter.
5. A method according to any preceding claim, the method further comprising choosing a transmission frequency for the transmitter which permits the maximum power spectral density for the transmission.  
30
6. A method according to any of claims 1 to 4, wherein the transmission from the transmitter is transmitted at a frequency derived by determining the strongest received beacon which represents any one frequency; thereafter selecting, from the determined

strongest beacons, the beacon with the lowest power; and transmitting at the frequency represented by that selected beacon.

7. A method according to claim 5 or claim 6, wherein a transmit power spectral  
5 density for a transmission from the transmitter is set dependent upon the strength of the received beacon at the chosen frequency.

8. A method according to any preceding claim, wherein the maximum permitted  
power spectral density of the transmitter is set at the product of the receiver beacon  
10 power; and a factor by which the receiver can be de-sensitised minus one; and the resultant of the receiver noise figure divided by the product of the effective bandwidth at the beacon receiver for receiving the beacon, the minimum signal to noise ratio for receiving the beacon in its effective bandwidth and the noise figure of the beacon receiver at the transmitter.

15 9. A method according to any preceding claim, wherein a random time division multiple access (TDMA) protocol is applied, whereby beacons representing different frequencies transmit at different times, such that over a series of cycles a beacon representing each frequency will be heard at a different time relative to another  
20 particular represented frequency, such that no one frequency at a higher power consistently blocks reception of a beacon representing another frequency at a lower power.

10. A method according to any preceding claim, wherein a code division multiple  
25 access (CDMA) protocol is applied, whereby beacons representing different frequencies are distinguished from one another by different codes.

11. A method according to claim 10, wherein a correlation period of a CDMA  
component of the beacon signal is controlled by an FFT controller.

30 12. A method according to any preceding claim, wherein each beacon transmits a type identifier and each beacon receiver comprises type specific correlation means,



such that a beacon receiver can ignore same type beacons in determining whether or not or how much power to transmit.

13. A method according to any preceding claim, wherein a receiver transmits a  
5 beacon only if interference levels exceed an acceptable value.

14. A method according to any preceding claim, wherein the beacon power is adapted to the wanted signal power received at the receiver.

10 15. A method according to any of claims 1 to 13, wherein the beacon power is adapted to the interference power received at the receiver.

16. A method according to any preceding claim, wherein a bandwidth managed by a beacon is sufficiently narrow that substantial correlation of shadow fading applies  
15 across that bandwidth.

17. A method according to any preceding claim, wherein each beacon occupies a frequency bandwidth which is small compared with the total bandwidth managed by that beacon.

20 18. A method according to claim 17, wherein neighbouring beacons in a managed bandwidth manage discrete contiguous sections of frequency, each section comprising a fraction of the beacon managed band, each beacon being separated from the frequency bandwidth which it manages by the alternate fraction.

25 19. A method according to claim 18, wherein each fraction is  $\frac{1}{2}$ .

20. A method according to any preceding claim, wherein the beacon receiver is periodically tested with an internal beacon of known power and its associated  
30 transmitter is prevented from transmitting if a beacon receiver fault occurs.

21. A method according to at least claim 9, wherein beacon reception and transmission happen at the same equipment, separated in time, by arranging for

reception to take place whenever transmission is not required according to schedules of the random TDMA protocol.

22. A communication network comprising at least one transmitter belonging to one  
5 communication system and at least one receiver belonging to another communication  
system, wherein a beacon transmitter transmits a beacon in a beacon transmission band  
representative of a frequency within a beacon managed band and is associated with the  
at least one receiver; and a beacon receiver is associated with the at least one  
transmitter; wherein the beacon transmitter transmits at a beacon transmission  
10 frequency separated from the frequency of the beacon managed band by transmitting at  
a different frequency to the frequency which it represents, whereby a power spectral  
density limit for transmission at any one transmitter is determined based upon the  
strength of the or each beacon received at the associated beacon receiver.

23. A transmitter for a communication system, the transmitter being provided with  
15 an associated beacon receiver to receive a beacon in a beacon transmission band  
representing a frequency in a beacon managed band, wherein the beacon managed band  
is separated from the beacon managed by being at a different frequency; and whereby a  
power spectral density limit for transmission from the transmitter is determined based  
20 on the strength of one or more beacons received at the associated beacon receiver.

24. A receiver for a communication system, the receiver being provided with an  
associated beacon transmitter, wherein the beacon transmitter transmits at a beacon  
transmission frequency separated from the frequency of the beacon managed band by  
25 transmitting at a different frequency to the frequency which it represents; whereby a  
beacon can be transmitted by the beacon transmitter to control interference, such that a  
desired maximum power spectral density of interference received at the receiver is  
satisfied.